

Branch Name:	Computer Engineering
Program Code:	ET103
Course Title:	Internet of Things
Course Code:	2ET1030603T
Pre-requisite Course:	Programming and Digital Concepts

Course Objectives:

- To introduce the terminology, technology of IoT
- To learn the concept of M2M (machine to machine) with necessary protocols
- Familiar with the Language which is used in many IoT devices
- To learn about platforms, that is widely used in IoT applications
- To implementation of web-based services on IoT devices

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topics	Total Hours	Weightage (%)
1	Introduction to Internet of Things: Definition and Characteristics of IoT, Sensors, Actuators, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.	6	15%
2	IoT and M2M: Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZE, YANG- NETCONF, YANG, SNMP NETOPEER	4	10%
3	IoT Physical Devices and Endpoints: Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins	6	20%
4	Controlling Hardware: Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor	10	30%
5	IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, web application framework Designing a RESTful web API	6	25%

Reference Books:

- Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
- Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
- Raspberry Pi Cookbook, Software and Hardware Problems and solutions, Simon Monk, O'Reilly (SPD), 2016, ISBN 7989352133895
- Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan
- Peter Friess, 'Internet of Things – From Research and Innovation to Market Deployment', River Publishers, 2014
- N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014

List of Open-Source Software/learning website:

- [Tinkercad - Create 3D digital designs with online CAD](#)
- [AWS Skill Builder - Internet of Things Foundation Series](#)
- [Calculator, breakout & Icon editor - Wokwi ESP32, STM32, Arduino Simulator](#)
- [Introduction to Internet of Things - Course \(nptel.ac.in\)](#)
- [An Introduction to Programming the Internet of Things \(IOT\) | Coursera](#)
- [Introduction to the Internet of Things and Embedded Systems | Coursera](#)

Course Learning Outcomes (CLO):

Course Outcomes	Description	Bloom's Taxonomy Level
COL1	Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved.	1.Remembering 2.Understanding
COL2	Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules	3. Apply
COL3	Market forecast for IoT devices with a focus on sensors	3. Apply 4. Analyze
COL4	Explore and learn about Internet of Things with the help of preparing projects designed	4. Analyze 5. Evaluate

Mapping of CLO with PO and PSO:

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CLO1	H	L	H	L	L	L	L	L	L		L	M	M	M
CLO2	H	L	H	L	M	L	L	L	L		L	M	M	M
CLO3	H	H	H	M	H	M	M	L	M		M	H	H	H
CLO4	H	H	H	M	H	H	M	H	H		H	H	H	H

H: High, M: Medium, L: Low